

# **Appendix L**

## **Soil Gas Survey**



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160 SPEAR STREET, SAN FRANCISCO, CALIFORNIA 94105, TEL. 415/777-2811

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July 2, 1992

U.S. Environmental Protection Agency  
Emergency Response Section (H-8-3)  
75 Hawthorne Street  
San Francisco, CA 94105

TAT#: 099206-T-001  
TDD#: T09-9204-0019  
PAN#: ECA-0747-SAA

Attention: William E. Lewis, Deputy Project Officer

Subject: Newmark NPL Site Assessment, San Bernardino, CA

## INTRODUCTION

This document summarizes site assessment activities conducted at the Newmark NPL site, 1380 West 48th Street, San Bernardino, California, (see Figure 1). The Environmental Protection Agency (EPA) directed the Technical Assistance Team (TAT) to develop a Site Safety Plan, write a Sampling Plan, conduct a soil gas survey to locate a buried trench and evaluate the threat of contaminate exposure to local residents.

The Newmark site was a private airport which ceased operation in 1958. Aerial photos from 1959 show a trench in the area that appears to have been used for a disposal area. In 1985 a residential development was constructed on the airport facility over the trench.

Previous studies have detected groundwater contamination at the site. Groundwater flow in the area was reported by EPA Remedial Project Manager K. Mayer to be to the south. A liquid waste disposal pit which is approximately 600 feet southeast of the trench is a suspected point source. Data from a remedial investigation monitoring well situated upgradient of the disposal pit and downgradient of the trench contained tetrachloroethene (PCE) and trichloroethene (TCE) contamination.

TAT and On-Scene Coordinator (OSC) B. Lewis were able to delineate the trench. The soil gas survey indicates that there is little contamination at the site. Based on this data the OSC and TAT concluded that there is no imminent or substantial threat to residents from the trench.

## SCOPE OF WORK

In preparation for the site assessment, TAT developed a Sampling QA/QC Work Plan (QASP) and a Site Safety Plan. During a meeting conducted on April 4, 1992, with OSC B. Lewis and TAT it was decided that soil gas screening would be conducted in the field and a limited number of confirmational soil gas samples would be sent to an analytical laboratory.

The location of the trench was transferred from the 1959 aerial photograph to an Assessor's Map which locates current structures. This process did not give a definitive location of the trench, an error of plus or minus 40 feet, due to scaling difficulties between maps, (see Figure 2).

The site assessment was conducted on May 28-29, 1992 by EPA On-Scene Coordinator (OSC) Bill Lewis, TAT members H. Edwards and P. Martin.

## DESCRIPTION OF SOIL GAS EXTRACTION METHOD

A Schonstedt Magnetic Locator Model GA-52B was used to survey for buried metal pipes at soil gas sampling points, (see Photo 1). A 8-12 inch deep hole was then dug to insure that PVC irrigation piping was not encountered (see Photo 2). Soil gas extraction was accomplished by driving a 5/8 inch diameter carbon steel gas probe into the ground 3 to 12 feet below ground surface (bgs) with a 12 pound slide hammer, (see Photo 3). The depth at which the sampling took place was a function of subsurface features encountered during probe driving. The probe was driven to the greatest depth manageable with the slide hammer. Probe placement was stopped when penetration rates greater than 40 blows were needed for 3 to 6 inches advancement. The frictional force exerted on the probe by the soil ensured that a sufficient seal around the probe was accomplished. The seal limited the amount of communication with the atmosphere and gave a better representation of the soil gasses present at the selected sampling depth. After reaching the desired depth the bar was lifted approximately four inches and 1/8 inch teflon tubing was inserted into the probe, (see Figure 3). To ensure that an air tight seal at the top of the soil gas probe was accomplished a piece of tygon tubing was tapered and silicon grease added then the tubing was inserted into the probe. A bead of water was added where the tygon tubing and the probe met, giving a visual check on the seal, (see Figure 3 & Photo 4). The organic vapor monitor (OVM) photoionization detector (PID) was attached to the teflon tubing, which were dedicated to each sample location, and measurements were taken, (see Photo 5). A desiccator and vacuum pump were used to extract one-liter Tedlar bag samples, (see Photo 6). The one-liter Tedlar bags were then analyzed using TAT's portable Photovac gas chromatograph (GC) set up in a recreational vehicle (RV), (see Photos 7 & 8). Eight 5-liter Tedlar bags were extracted as confirmational samples and sent to Performance Analytical, of Canoga Park, CA. Decontamination of the probes was performed between each sampling event by wiping excess soil of the probes, wiping the probes with Acetone, then rinsing the probes with de-ionized water, (see Photo 9 & 10). The annulus of the

probes were periodically checked with the OVM to insure that readings encountered during soil gas extraction were not a function of decontamination solutions. All tubing used for soil gas extraction was dedicated.

#### DESCRIPTION AND DISCUSSION OF FIELD GC METHOD

Soil gas samples were analyzed on a Photovac portable GC Model 10S70 on site by TAT chemist H. Edwards. A temporary laboratory was set up in an RV which provided air conditioning needed for temperature stabilization. The field analytical data for the Newmark NPL site assessment has been reviewed and can be found in Appendix I. Table 1 lists compounds of interest and the approximate TAT Quantitation Limits of the analytes. The primary objective of this field analytical method was to provide QA level 1 analytical data for the site assessment.

Approximately one-liter of soil gas was collected in each Tedlar bag. An aliquot of soil gas from the bag was extracted with a syringe and injected into a field gas chromatograph. The gas chromatograph contained an analytical column that was operated at a constant temperature. A PID was used to tentatively identify and quantify the target analytes.

For a more thorough discussion of the GC method performed in the field see Appendix II, Analytical Work Plan, Newmark Soil Gas Study.

#### RESULTS AND CONCLUSIONS

TAT successfully completed both major objectives of this site assessment, namely, the location of the trench and evaluation of potential exposure to local residents.

The location of the trench was inferred by noting the depth and rate of penetration of the soil gas probe. Penetration rates and depths were much lower in soils associated with fill material and natural soils than locations in the trench. Three sample points were located in the trench (NSB's 4, 8 & 16) and six sample points surrounded the trench, (see Figure 2).

OVM readings were taken at each soil gas sampling location, (see Table 2). OVM readings at sample locations NSB's 4, 11, 12, 13 & 15 may be the result of degradation gasses. These readings were not persistent and non-detect readings were measured after purging. OSC B. Lewis and TAT P. Martin theorized that organic material associated with fill used during construction created the degradation gasses. As organic material decomposes it produces gasses which the PID of the OVM can detect. At sample location NSB-6 a piece of 1X4 inch redwood was found at 10 inches bgs.

Analytical results for PCE in the trench samples were below the background value, (see Table 2 and Figure 2). Elevated levels of PCE, greater than background, were detected at sample locations NSB's 2 & 12. As the highest levels of PCE

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detected were from sampling points away from the trench it is very unlikely that PCE contamination originates in the trench.

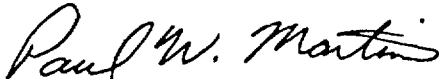
TCE was not detected at any sample location.

Results of the soil gas survey indicates that there is no imminent or substantial hazard from the trench to residents of the development. Continuous OVM monitoring of the ambient air during the survey gave no elevated readings.

Correlation of validated data from the analytical lab and field GC was very good. OVM screening was useful, even with the interference due to possible degradation gas from the poor fill material used in construction of the development.

If you have any further question regarding this report, please do not hesitate to contact this office.

Respectfully submitted,



Paul W. Martin  
Technical Assistance Team Member

cc: File

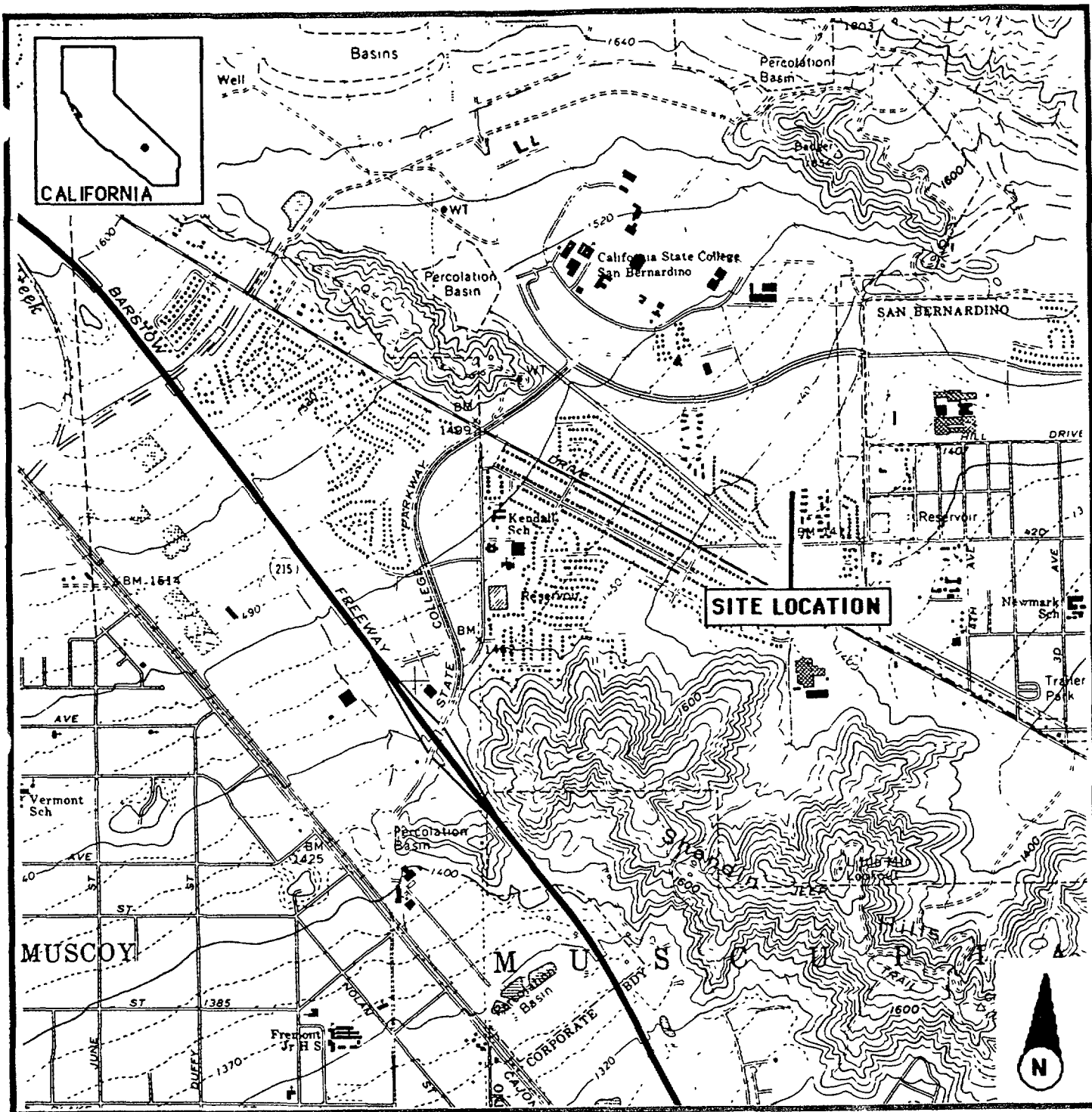
TABLE 1  
Newmark NPL Site Assessment  
Target Compound List and Quantitation Limits

COMPOUND	Quantitation limit
Trichloroethylene (TCE)	1 ppm
Tetrachloroethylene (PCE)	1 ppm
Benzene	1 ppm
Toluene	1 ppm
Xylenes, total	1 ppm

TABLE 2  
Newmark NPL Site Assessment  
Probe Depth, OVM, Field GC and Analytical Results

SAMPLE	DEPTH (ft)	PCE ppm/ppb (1)	TCE ppm/ppb (1)	BENZENE ppm	TOLUENE ppm	XYLENES ppm	OVM ppm
BG-1	5.0	ND/1.6	ND/ND	ND	ND	ND	0.0
NSB-2	5.0	ND/4.7	ND/ND	ND	ND	ND	0.0
NSB-3	4.5	ND/NS	ND/NS	ND	ND	ND	0.0
NSB-4*	8.0	ND/1.3	ND/ND	ND	ND	ND	14.4
NSB-5	7.5	ND/NS	ND/NS	ND	ND	ND	0.0
NSB-6	6.0	ND/NS	ND/NS	ND	ND	ND	0.0
NSB-7	4.0	ND/NS	ND/NS	ND	ND	ND	0.0
NSB-8*	8.0	ND/NS	ND/NS	ND	ND	ND	0.0
NSB-9	5.5	ND/NS	ND/NS	ND	ND	ND	0.0
NSB-10	5.0	ND/NS	ND/NS	ND	ND	ND	0.0
NSB-11	5.0	ND/1.2	ND/ND	ND	ND	ND	0.9
NSB-12	4.0	ND/2.3	ND/ND	ND	ND	ND	12.3
NSB-13	3.5	ND/.75	ND/ND	ND	ND	ND	7.8
NSB-15	3.0	ND/NS	ND/NS	ND	ND	ND	3.0**
NSB-16*	12.0	ND/1.2	ND/ND	ND	ND	ND	0.0
QUANTITATION LIMITS		1/0.75	1/0.94	1.0	1.0	1.0	

NOTES: (1)= For TCE and PCE, ppm values refer to field GC results, ppb values refer to analytical lab results  
ND = Not Detected  
NS = Not Sampled  
\* = Sampling point located in trench  
\*\* = OVM reading in hole, OVM reading taken through the probe was 0.0 ppm



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**FIGURE 1**  
 Newmark NPL Site Assessment  
 San Bernardino, California



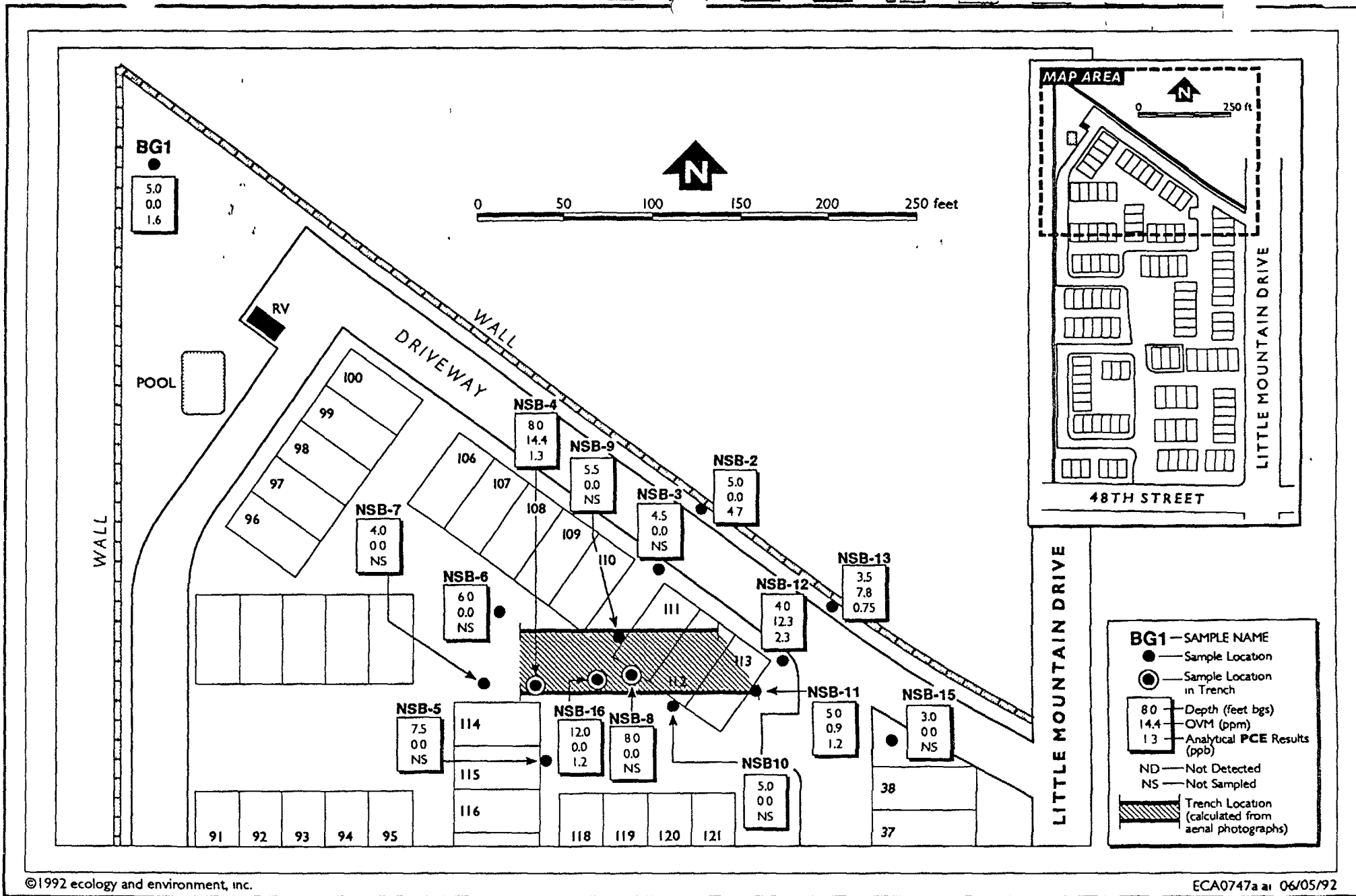
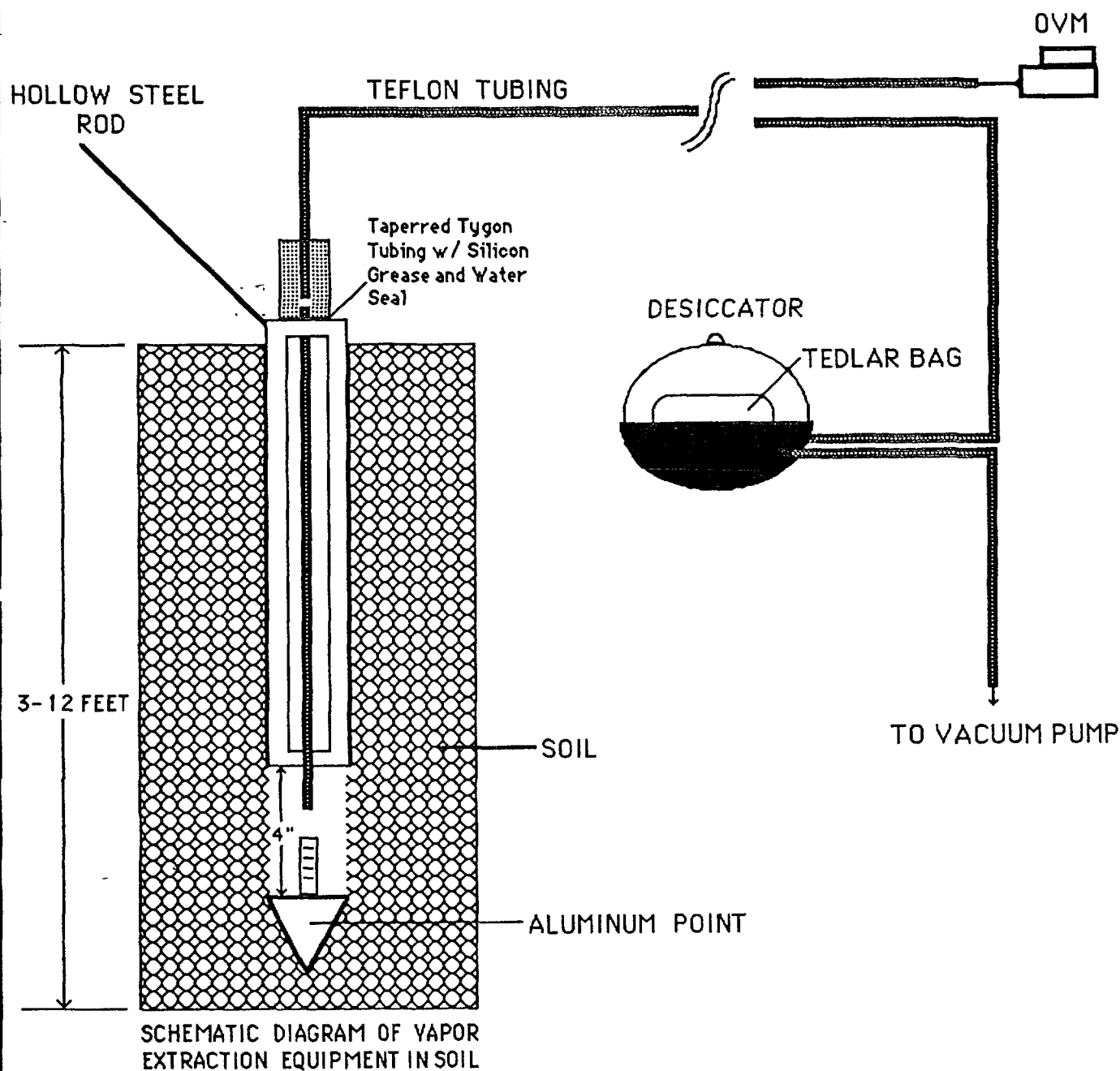


Figure 2  
**SOIL GAS EXTRACTION LOCATIONS**  
**NEWMARK NPL SITE ASSESSMENT**  
 San Bernardino, CA



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**FIGURE 3**  
 Soil Gas Sampler Schematic  
 Newmark Site Assessment  
 San Bernardino, CA

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Newmark NPL Site Assessment, San Bernardino, CA

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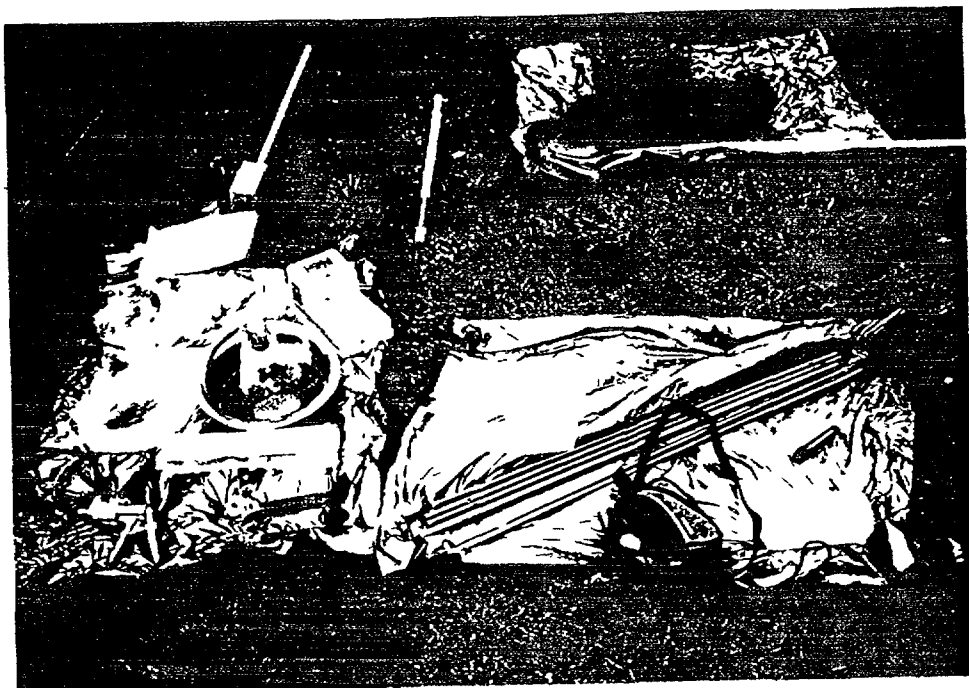


Photo 1: (Top)

Staging of soil gas sampling  
equipment, note yellow Schinstedt  
Magnetic locator



Photo 2: (Right)

PVC irrigation pipe encountered  
during soil gas survey

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Photo 3: (Right)

Utilizing the 12 lb slide  
hammer to drive the soil  
gas probe into the ground



Photo 4: (Bottom)

Tygon, silicon grease and water  
seal used during soil gas sampling



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Photo 5: (Top)

OVM sampling of soil gas



Photo 6: (Right)

Tedlar bag sampling utilizing  
a desiccator

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Photo 7: (Top)

RV used as mobile GC laboratory

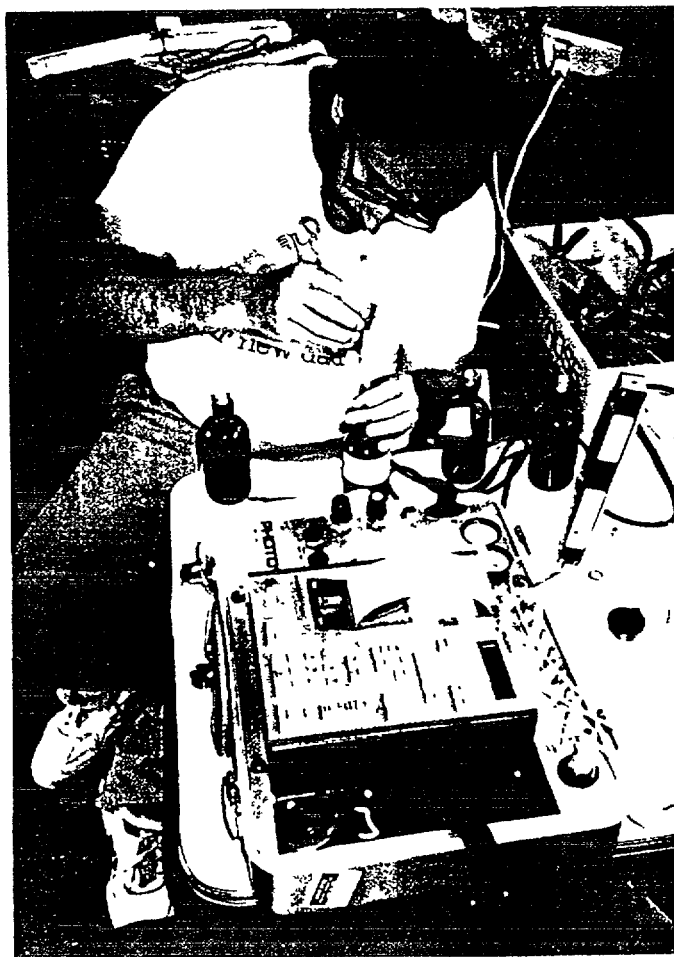


Photo 8: (Right)

Field portable Photovac GC

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Photo 9: Acetone wipe of soil gas probes



Photo 10: De-ionized water rinse of soil gas probes

APPENDIX I





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### ANALYTICAL SUMMARY MEMORANDUM

TO: Paul Martin

FROM: Howard Edwards

DATE: June 3, 1992

SUBJECT: Field Analytical Data For The Newmark NPL Site Assessment

The analytical data for Newmark NPL site assessment has been reviewed, (PAN#: ECA-0747-SAA & TDD#: T099204-0019). Reportable data was generated on the following dates: May 28 and May 29, 1992.

#### DATA AND DATA QUALIFICATIONS

##### I. Sample Holding Time:

All samples were analyzed within 2 hours of collection.

##### II. Instrument Performance:

Instrument performance was acceptable. Uncontrollable increases in ambient temperature affected the temperature of the chromatograph column. The increased column temperature caused the retention times of all analytes to decrease as the day progressed. However, periodic analysis of calibration gasses documented the retention time shifts.

##### III. Calibration:

The calibrations were acceptable. The single point calibrations were within one magnitude of all sample analyte concentration. Calibration QC was within the - 50 % to 100 % difference (%D) range for all detected analytes. It should be noted that standard concentrations in volume/ volume are based on an assumption of standard temperature and pressure. The actual temperature and pressure of the gas standards were not documented.

#### IV. Matrix Spike:

The matrix spike and matrix spike duplicate recoveries were lower than recommended for PCE, benzene, toluene, and xylenes. Therefore, any reported concentration of these analytes may be less than actual concentration (low bias). However, since concentrations above the quantitation limit were not found, this low bias had no effect on the analytical data.

#### V. Blanks

Method and instrument blanks on 5-28-92 indicated a continuous contamination of approximately 5 ppm xylenes in all analytical runs. Therefore the quantitation limit was estimated to be at 10 ppm for xylenes on that day. Other analytes in blanks from 5-28-92, and all blanks from 5-29-92 were acceptable.

#### VI. Data and Overall Assessment:

The data is acceptable as screening (QA-1) data and correlates with validated conformation (QA-2) data from a commercial lab. Because of this high correlation between data sets, the confidence in the screening data is high.

DATA TABLE

SAMPLE	TCE	PCE	BENZENE	TOLUENE	XYLENES
BG-1	ND	ND	ND	ND	ND
NSB-2	ND	ND	ND	ND	ND
NSB-3	ND	ND	ND	ND	ND
NSB-5	ND	ND	ND	ND	ND
NSB-6	ND	ND	ND	ND	ND
NSB-7	ND	ND	ND	ND	ND
NSB-8	ND	ND	ND	ND	ND
NSB-9	ND	ND	ND	ND	ND
NSB-10	ND	ND	ND	ND	ND
QUANTITATION LIMITS	1 ppm	1 ppm	1 ppm	1 ppm	10 ppm
NSB-11	ND	ND	ND	ND	ND
NSB-12	ND	ND	ND	ND	ND
NSB-13	ND	ND	ND	ND	ND
NSB-15	ND	ND	ND	ND	ND
NSB-16	ND	ND	ND	ND	ND
QUANTITATION LIMITS	1 ppm	1 ppm	1 ppm	1 ppm	1 ppm

#### METHOD DOCUMENTATION

The method as documented in the Analytical Work Plan Soil Gas Study (see Appendix II) was followed with no deviation.

#### STANDARD DOCUMENTATION

One primary standard was prepared on 5-28-92 (Stock #1). See TABLE 1 for concentrations.

TABLE 1  
STOCK #1 in 250 ml bottle

Compound	uL added	weight/volume mg/Liter	volume/volume ppm @ STP
TCE	9.8	57.4	9,790
PCE	9.5	61.7	8,330
Benzene	9.5	33.4	9,590
Toluene	10.0	34.7	8,440
Xylenes	28.0	97.2	20,500

Three calibration standards were prepared from the primary standard during this project. The first calibration standard (designated as Low #1 and prepared on 5-28-92) was use for the initial calibration. The second calibration standard (prepared on 5-28-92 as Low #2) was used for continuing calibrations on 5-28-92. The final calibration standard (prepared on 5-29-92 and designated Low #3) was used for continuing calibrations on 5-29-92. See TABLE 2 for concentrations.

TABLE 2

LOW #1, #2, and #3 in 250 ml bottles

Compound	uL of Stock #1	weight/volume ug/Liter	volume/volume ppm @ STP
TCE	200	45.9	7.8
PCE	200	49.4	6.7
Benzene	200	26.7	7.7
Toluene	200	27.8	6.75
Xylenes	200	77.8	16.4

APPENDIX II

Analytical Work Plan

Soil Gas Study

## 1.0 SCOPE, APPLICATION, AND LIMITATIONS

- 1.1 This TAT field method is proposed for use in determining the estimated concentration of specific volatile organic compounds in soil gas.
- 1.2 Table 1-1 lists compounds that may be determined by this method with the approximate Quantitation Limits.
- 1.3 The method will be used only by trained personnel under supervision of an experienced chemist.
- 1.4 The primary objective of this field analytical method is to provide QA level 1 analytical data for a TAT site assessment. Identification of specific target compounds and prior knowledge regarding potential matrix interferences are prerequisites for the successful use of this field method.

TABLE 1-1  
TARGET COMPOUND LIST AND  
QUANTITATION LIMITS

COMPOUND	Quantitation limit
Trichloroethylene (TCE)	1 ppm
Tetrachloroethylene (PCE)	1 ppm
Benzene	1 ppm
Toluene	1 ppm
Xylenes, total	1 ppm

## 2.0 SUMMARY OF METHOD

Approximately 1 liter of soil gas is collected in a Tedlar bag. An aliquot of soil gas from the bag is extracted with a syringe and injected into a field gas chromatograph system.

The gas chromatograph contains an analytical column that is operated isothermally.

A photoionization detector (PID) is used to tentatively identify and quantify the target analytes.

### 2.1 Equipment and Reagents

Standards will be prepared using reagent grade solvents. Hydrocarbon free air will be used as a carrier gas. Standards will be prepared volumetrically, with the density of the solvents accounted for to calculate the weight/volume concentration. The volume/volume concentration will be calculated assuming standard temperature and pressure.

Other equipment includes:

Photovac portable GC 10S70  
Gas tight syringes  
Tedlar gas sampling bags  
Flow meter  
Standard preparation bottles  
Carrier gas cylinder, gas regulator, and gas lines  
Oven  
Air heater

## 3.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

Samples should be handled, preserved, and transported following procedures outlined in the site specific Quality Assurance Sampling Plan. Samples should be analyzed within 72 hours of collection.

## 4.0 METHODOLOGY

### 4.1 Standard Preparation

All standards will be prepared volumetrically with clean glassware and gas-tight syringes. Primary standards will be stored for up to 2 days. Calibration standards will be stored for one day. Preparation of all standards will be recorded in a log book.

#### 4.1.1 Primary Standards

The primary analytical standard will be prepared by combining aliquots of the target compounds in a volumetric bottle. Aliquots of the target compounds will be measured into the bottle with an analytically accurate syringe. The specific volume is dependent upon the density of the compound. The mixture is vaporized within the bottle using a portable heating unit.

To calculate the concentration in weight/volume (w/v) for a specific compound in the mixture:

$$\text{Concentration (w/v)} = \frac{\text{Volume of Compound} \times \text{Density of Compound}}{\text{Final volume}}$$

To calculate the concentration in volume/volume (v/v) for a specific compound in the mixture:

$$\text{Concentration (v/v)} = \frac{[\text{Concentration (w/v)} \times K \times 1,000]}{\text{Mole Weight}}$$

where K = volume of one mole of ideal gas (22.4 Liters if Standard Temperature and Pressure is assumed)

#### 4.1.2 Calibration Standards

Calibration standards are prepared from primary standards by the transfer and vaporization of the primary standard into a clean, glass flask.

To calculate the concentration of a specific compound in the standard:

$$[\text{Gas concentration v/v}] = \frac{\text{Volume initial} \times [\text{conc. primary v/v}]}{\text{flask volume}}$$

#### 4.1.5 Standard Introduction

The calibration standards are injected directly into the gas chromatography system.



#### 4.2 Sample Introduction

A 100 ul aliquot of gas from the gas sampling bag is injected directly into the gas chromatograph system.

#### 4.3 Instrument Parameters

Carrier Gas flow : 10 ml/min.  
Column Temperature : 30 degrees Celsius  
Gain : 20  
Back-flush delay : 150 seconds  
Slope sensitivity : 18 16 6 mV/second  
Minimum area : 10 mVseconds  
Window width : 10 %

#### 4.4 Analytical Sequence

- 4.4.1 All air sample collection bags and gas syringes will be checked to determine that they are free of contamination prior to analytical use.
- 4.4.2 Calibration  
  
An initial aliquot of the continuing calibration standard shall be analyzed periodically.
- 4.4.3 A blank air sample shall be analyzed after calibrations in the same manner as actual samples.
- 4.4.4 As many as 10 samples can be run daily without performing a continuing calibration provided there are no significant retention time shifts.
- 4.4.5 A matrix spike/matrix spike duplicate shall be analyzed periodically by spiking and analyzing a previously analyzed sample bag.

#### 5.0 CHROMATOGRAPHY AND CALCULATIONS

##### 5.1 Volatile Organic Compound Identification

Qualitative identification of target compounds is based on photoionization detector (PID) sensitivity and retention time. Generally, individual peak retention times should be within 5 % of the continuing calibration retention time for the analyte in question.

Quantitation of target volatile organic compounds is based on a single point, external calibration method.

## 5.2 Initial Calibrations

The analyte concentrations for calibration, at near the quantitation limit, are between 5 and 10 ppm v/v. In general, the calibration standard concentration should be within one order of magnitude of the sample concentration.

The response factor (RF) of each target compound is determined by using the following equation:

$$RF = mVs / \text{concentration}$$

where: mVs is the integrated peak area in millivolt seconds.

## 5.3 Continuing Calibration

A continuing calibration is run periodically to compensate for retention time shifts and to verify that the analytical system is stable.

The percent difference (%D) between initial and continuing calibration calculated using the equation below for each analyte should be between -50 % and 100 %.

$$\%D = \frac{\text{Expected concentration} - \text{reported concentration}}{\text{Expected concentration}}$$

## 5.4 Sample Quantitation

Analyte concentration of an unknown is determined by using the following equation:

$$\text{Concentration} = mVs / RF$$

Result are reported in ppm with corrections for blank contamination.

## 6.0 QUALITY ASSURANCE PROCEDURES

### 6.1 Objective

The objective of the quality assurance procedures is to ensure that analytical data generated during the project is of a known quality and meets screening (QA-1) quality control objectives as specified in OSWER directive 9360.4-01 "Quality Assurance/Quality Control Guidance for Removal Activities."

### 6.2 Quality Control Checks

The quality control procedures include initial and continuing calibrations, method blanks, and analysis of quality control samples (matrix spikes and duplicates).

In general, quantitative results will be evaluated using the following criteria and qualified accordingly:

- o Method blanks are free of contaminants of concern, i.e. no target analytes are detected above the detection limit.
- o Reported sample concentrations are within one magnitude of standard concentration.
- o Matrix spike recovery and reproducibility are determined within stated quality control limits.
- o Continuing calibration concentrations are within stated quality control limits.

In general, qualitative identifications will be evaluated using the following criteria and qualified accordingly:

- o A target compound identified in a sample should have a chromatographic retention time within 5 % of continuing calibration retention time.
- o The sample is free of matrix interference.

### 6.3 Corrective Action

Should quality control data indicate a problem with the analytical system or procedures, appropriate measures will be taken to correct the problem prior to further analyses.

Analytical data that does not meet quality control criteria limits will be qualified.

#### 6.4 Quality Assurance Reports

Data quality will be assessed as the data is generated and prior to informal reporting of any results. Data judged to be suspect in any manner will be qualified.

Prior to the final report, analytical and quality control data will be reviewed by a TAT chemist. The quality control and quality assurance data will be included in the final analytical reports.

### 7.0 DELIVERABLES

#### 7.1 Informal Report

Verbal or draft summary of sample results should be available within a few hours of sample receipt.

#### 7.2 Final Report

A final report will be generated for the project and should include:

- o Documentation of any changes to the established method.
- o Documentation of standards preparations.
- o The data summary and QC data summaries including all reportable results, with units clearly specified.
- o A hard copy of all data.
- o The analytical field log.
- o A computer disk with all generated data and reports.

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